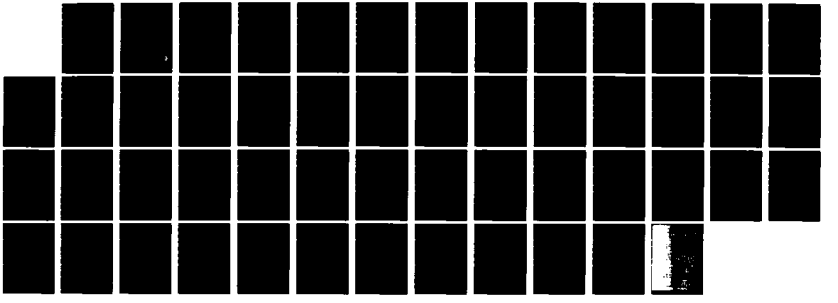
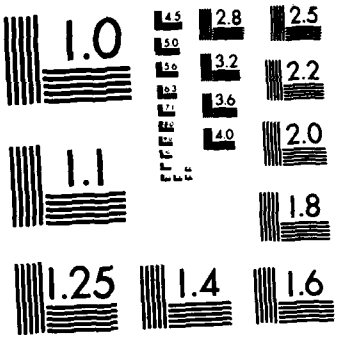
AD-A128 580 A MINIMUM SPACE GUIDELINE FOR US AIR FORCE OPTOMETRY SERVICES(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH M R UTECH MAY 83 AFIT/CI/NR-83-14T 1/1

UNCLASSIFIED F/G 6/5 NL





REPORT DOCUMENTATION PAGE

1. REPORT NUMBER: AFIT/CI/NR 83-147	2. GOVT ACCESSION NO. A128580
4. TITLE (and Subtitle): A Minimum Space Guideline for U.S. Air Force Optometry Services	5. TYPE OF REPORT & PERIOD COVERED: THESIS/DISSERTATION
7. AUTHOR(s): Marlon R. Utech	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: AFIT STUDENT AT: Pacific University	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: AFIT/NR WPAFB OH 45433	12. REPORT DATE: 1983
	13. NUMBER OF PAGES: 75
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASS
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

APPROVED FOR PUBLIC RELEASE: IAW AFR 190-17

Lynn Wolaver 17 May 83
LYNN E. WOLAVER
Dean for Research and
Professional Development
AFIT, Wright-Patterson AFB OH

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

ATTACHED

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE UNCLASS

THESIS ABSTRACT

Title: A Minimum Space Guideline for U.S. Air Force Optometry Services

Author: Marlon R. Utech
Capt, USAF, BSC

Date: 1983 Pages: 45

Degree: Master of Science in Clinical Optometry Management

School: Pacific University College of Optometry

The purposes of this study are; 1) to review and analyze present guidelines concerning Air Force optometric workspace allocation, and 2) to develop a proposal for new guidelines based on accepted standards found in the literature. A review of the literature concerning optometric clinical design is presented. The information gathered from the review is analyzed to determine the minimum space required for one optometrist and one technician to efficiently deliver full scope optometric care. The existing Air Force space allocation guidelines are critiqued by comparing them to these newly derived minimum space requirements. It is determined that an optometric service should contain at least 6 discrete areas covering a minimum of 654 sq. ft.. The current guidelines call for only 4 different areas covering 440 sq. ft.. The newly derived space requirements are proposed as more cost-effective alternatives for guidelines and are used in the derivation of a model floorplan. It is concluded that an updating of current optometric space allocation guidelines, to include more space for additional services, would be conducive to more efficient delivery of Air Force vision care.

A MINIMUM SPACE GUIDELINE FOR U.S. AIR FORCE OPTOMETRY SERVICES

A Thesis Presented to
the Faculty of the Graduate School of
Pacific University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
Marlon R. Utech

May 1983

APPROVED

THESIS COMMITTEE

(John R. Roggenkamp)
Chairman

(A. Richard Reinke)

(Michael Prell)

Graduate Council

(David R. Malcolm)
Chairman

TABLE OF CONTENTS

List of Tables

Introduction

Background

In order to adequately practice their profession, optometrists need clients to serve, materials and equipment to utilize, and a setting in which to work. For military optometrists, these things are all provided.

The client population of the military optometist is made up of all persons who are authorized care at military medical treatment facilities. In the continental United States, this population includes all active duty and retired personnel from the Department of Defense, the Coast Guard, and the Commissioned Corps of the Public Health Service and National Oceanic and Atmospheric Administration, as well as all their legal dependents and survivors. This population totals approximately ten million individuals.(2)(3) Since there are some 600 military optometrists presently on active duty in the U.S., this is a ratio of over 16,600 clients per optometrist. In contrast, the average number of persons per practicing optometrist nationwide is 11,500. The American Optometric Association has long recommended that 7,000 persons per optometrist is the ideal ratio.(20)

The equipment used by the military optometrist is purchased by his particular service branch. The exact procedure followed for acquiring equipment varies with the specific situation, however,

the individual optometrist does have the ability to request the acquisition of equipment or instruments he feels is needed.

The military optometrist cannot generally request what he feels is needed when it comes to his work setting, however. Only when a new facility is in the planning stages and the optometrist can manage to have some input into the planner's decisions does he exercise any control over his allotted workspace. It is this situation, the planning and designing of military optometric workspace, specifically of U.S. Air Force optometry services, that will be dealt with in this study.

Statement of the Problem

When a new medical treatment facility is to be built on an Air Force installation, a facility planning committee, made up of the health care providers currently assigned to that installation, is formed. The committee members provide the professional designers with input concerning the workspaces needed for their respective services. The optometrists assigned to the installation will try to get as much space as possible allocated to their own service, as will every other health care specialty.

Air Force Manpower Standard 5235 delineates exactly what professional care the Air Force optometrist is responsible for delivering.(14) This delineation is very detailed and encompasses the full scope of optometric practice as currently defined.

(5)(41)(52) In order to adequately deliver these varied and numerous delineated professional services, adequate space must be provided. Air Force optometrists have long put forth the view that they have an inadequate amount of workspace available at most installations. (18) A survey of the floorplans of all the Air Force optometry services in the continental United States has led the author to agree with this.(19) It appears that most Air Force medical treatment facilities have insufficient space allocated to the optometry service in order for full scope optometric care to be adequately delivered. This is the problem this study will address.

Significance of the Problem

The need for optometric vision care is the second most prevalent chronic health condition in the population of the United States. (41) As mentioned previously, there are some ten million beneficiaries authorized optometric care by the approximately 600 military optometrists practicing in the continental United States. (12) It is obvious, with these kinds of numbers, that each facility must operate with very high efficiency in order to accomplish its task. Efficient patient care requires adequate, well designed spaces within which to deliver that care. (42) The amount and design of available clinical space is a major decisive element in determining the number of clients which can receive given services from a set number of providers. (34)

As with any pre-paid type of health care system, efficiency underlies cost-effectiveness. The Air Force health care system has a finite budget with which to accomplish its mission. Cost-effectiveness, then, must always be sought. Decreased efficiency due to inadequate workspace leads to a decrease in cost-effectiveness.

There is another threat to cost-effectiveness posed by inadequate workspace, as well. If a given facility cannot provide a needed service to a client, that client must travel to another facility. In the case of active duty military clients, this would mean a loss of time on the job as well as payment of travel expenses. If the client is sent to a civilian provider for the needed service, this would entail full cost payment for the services. For non-active duty clients who must use civilian providers, CHAMPUS, a government sponsored insurance program for military health care beneficiaries, pays for most of the care, with the client sharing a small portion of the expense. It has been well established that care under CHAMPUS is not as cost-effective as care delivered in military facilities.(12)(30)(37)(39) Most of what is considered "routine vision care" is not covered by CHAMPUS at all and, thus, its full cost must be born by the individual.

Some of the same services which optometry can provide are also provided by the profession of ophthalmology. If an optometry service has inadequate space within which to provide certain specialty care, the burden of providing this care often falls upon

an ophthalmology service. Only 48% of Air Force beneficiaries are located in an area having primary access to an ophthalmology service. The remaining 52% are in service areas which rely solely on optometry for primary vision care.(2) Within the Air Force system, ophthalmological services are provided at a much higher cost than are optometric services. These factors make the utilization of ophthalmology for services which could be provided by optometry a less cost-effective system.

The author believes that if all of the above delineated losses of cost-effectiveness were taken into account throughout the Air Force, the cost to the Air Force would be significant. This cost, added to the other by-products of inadequate optometric workspace, such as staff dissatisfaction with their working conditions and client inconvenience, makes this problem a significant one indeed. (10)

Statement of Purpose

Air Force optometry is thus faced with a problem, namely, allocation of insufficient workspace within which to practice the full scope optometry which Air Force regulation requires to be done. This problem exists in all sizes of Air Force facilities from the oldest ones still in use to the very newest ones just constructed. It is important, therefore, that the guidelines used in the design of Air Force optometric workspace be critically examined in the light of this situation.

As mentioned earlier, optometrists assigned to installations due to have new medical treatment facilities constructed can have input into the design phase. There is a time span of years between design and construction completion, however, so the optometrists who help design the facilities rarely ever utilize them, due to the assignment rotation of Air Force personnel. Since they know this at the beginning, the intensity of the personal involvement in this extra duty is often minimal on the part of most personnel.

The published guidelines which are in use to design Air Force optometric workspace are the basis of the problem. Since, as outlined above, input from assigned optometrists is often minimal, these guidelines are leaned on heavily in the design of new facilities. The guidelines were developed by architects and planners as part of a facilities development model for military hospitals.(7) This model allocates space based on work units being done at an installation, as opposed to the work which needs to be done, a problem which has been addressed elsewhere.(12)(47) Another fallacy in the guidelines is in cases of new installations only the active duty military population to be served is considered in arriving at space requirements.(12) The current model is also geared toward outpatient space requirements needed to support a hospital facility, however, optometry is not a hospital-based profession and should not have its workspace designed with hospital size or function in mind. Optometry can be just as effective at free-standing base level outpatient clinics

as at large, centralized referral center hospitals.

The purpose of this study is to develop new guidelines for the design of Air Force optometry service workspace which will allow full scope optometry to be practiced at all facilities. This guideline development is to culminate in a specific floorplan to be used as a model for new optometry workspace construction. The proposed floorplan is intended to be the minimum space required for an optometrist and an assistant to practice full scope optometry adequately within the Air Force health care system.

Importance of the Study

A problem has been outlined which is adversely affecting cost-effective eye care within the Air Force health care system. If, however, the solution to the problem is to incorporate more space into newly constructed facilities, that will of course increase construction and operating costs. The author believes that the slightly increased initial construction and subsequent maintainence costs would be far outweighed by the future savings the increased space would garner. The cost of the everyday outbound referrals made necessary by inadequate in-house space, totaled over the twenty- to thirty-year life expectancy of a new facility, would be enough to make the initial construction investment worthwhile. Recent studies have supported these concepts concerning military health care facility construction and overall medical facility construction.(12)(28)

It is often difficult for locally assigned personnel to become intensely involved in the planning of new facilities. If they had a floorplan design, with which they could agree in principle, readily available for reference, it would be much easier for them to have input above and beyond the existing guidelines. The floorplan which this study proposes to develop could act as such a reference. As has been argued, the existing guidelines used as a reference lead to optometric space allocation which is not cost-effective.

The Department of Defense has an ongoing program to renovate and replace its medical treatment facilities.(12) The Air Force, specifically, is currently in an extremely active building phase. It is therefore imperative to update workspace design guidelines, such as this study proposes to do, as soon as possible if they are to be used for this current construction activity.

In 1979, a tri-service Department of Defense Health Affairs Space Planning Panel was organized to update health care facility space planning criteria.(12) It is important for optometry to have input into this panel if it is to better its current space allocation situation. A well supported argument for expanded optometric workspace, such as this study proposes to be, would be helpful toward meeting this requirement for input.

It is not unheard of in Air Force medical facilities for medical

specialties, which are placed higher administratively than optometry, to acquire previously allocated optometric workspace for their own use.(17) This being the case, it is important for optometry to gain and defend as much workspace as possible, especially in the early utilization of a new facility. A defensable updated space requirement guideline would be a useful reference to have in this situation.

This study is intended to be a proposed solution to the problem of the existence of inadequate guidelines for the allocation of Air Force optometric workspace. In addition to adding a new element to the literature on this subject, the study has several practical applications, which have been delineated above. The several immediate situations to which the results can be applied, in addition to its use for future planning, make this study an important one to be done.

Methodology

Aim of Study

There are specific published guidelines which are used in the design of new Air Force optometry service workspace. There is also much other published material available concerning optometric and related workspace design. The aim of this study is to review and analyze all of this information with a two-fold purpose.

The first purpose is to review the present Air Force guidelines and analyze them as to their adequacy in developing cost-effective optometric workspace design. The second purpose is to develop a proposal for new guidelines, which can be used to design a minimum standard workspace for the cost-effective delivery of Air Force optometric care.

Method of Study

The basis for the conclusions drawn in this study will be a review and analysis of published literature relevant to the subject. The literature review and subsequent derived conclusions will be patterned after the following five step process.

Step One: A review of optometric literature, concerning what constitutes "full scope" optometric care and the space required to adequately practice it, will be conducted.

Step Two: A review of architectural literature, concerning eye care and related clinical workspace design, will be conducted.

Step Three: A review of Air Force literature, concerning the mission of Air Force optometrists and the guidelines used in the allocation of Air Force optometric service workspace, will be conducted.

Step Four: The Air Force space guidelines currently in use will be

critiqued by comparing them to the information found in the civilian optometric and architectural literature, as well as with the defined mission of Air Force optometrists.

Step Five: The information gleaned from the literature review will be used to derive new guidelines for the allocation of Air Force optometric workspace, encompassing whatever improvements to current guidelines are found to be needed by the above mentioned critique.

Product of the Study

As mentioned in step five above, new guidelines for the allocation of Air Force optometric workspace are to be derived in this study. These guidelines will be made up of stated space requirements which are defenseable, since they will be based on published data. Such defenseable guidelines should be of help in the ongoing attempt to procure more workspace for Air Force optometrists.

As a conclusion to this study, the derived guidelines will be used to design a specific floorplan. The floorplan is intended to be a minimum square footage standard within which one optometrist and an assistant can adequately deliver cost-effective optometric care. Variations on, or multiples of, this floorplan can then be easily used as input into the design of new medical treatment facilities.

Review of the Literature

Optometric and Related Medical Literature

Much of the literature on clinical design deals with economics and ignores therapeautics, however, it has been well established that physical environment greatly affects patient behavior and compliance, staff interaction, and the quality of diagnosis and treatment.(10) A basic philosophy concerning how one is going to practice should precede any workspace design development program.(22)(51) It is therefore necessary to first delineate what constitutes full scope optometric practice.

The Journal of Optometric Education defines an optometrist as a health care provider who prevents, diagnoses, treats and/or manages visual and ocular problems, enhances visual performance, provides health screening, provides health education, advises on the visual environment, and serves as an administrator for the delivery of health care.(52) This general definition encompasses all of the specific clinical procedures an optometrist might perform.

The diagnosis of visual or ocular problems could fall into any of four categories; refractive errors, binocular dysfunctions, performance problems, and eye diseases.(5)(41) The diagnostic procedures optometrists perform include case history taking, refractive studies, visual skills testing, developmental vision

studies, subnormal vision testing, visual fields testing, and specific tests for ocular pathology detection.(41)(46)

Once the diagnosis of a problem is made, specific treatment or management must be prescribed. The treatment modes employed by optometrists include advice and consultation, spectacles, contact lenses, vision training, low vision aids and rehabilitation, as well as referral to other appropriate health care providers. Many of these modes are also used in the prevention of possible future problems and the enhancement of current visual function. (5)(41)(46)

Optometry is a primary health care service, since roughly half the population needs optometric services and, by definition, a primary health service is one which is needed by more than 29% of the population.(41) As such, optometrists are responsible for providing general health screening, health education, and advice on health related matters. This also puts optometrists in a position to administrate health care delivery.

Physical facility design is a very neglected area in health care education, consequently, not much literature on the subject has been published by optometrists or other health care providers. (43) A few dedicated individuals have studied the subject thoroughly however, and their conclusions will be outlined here.

Wein states that the important idea to keep in mind when beginning

the planning of medical office space is that form follows function.(51) The rooms should be designed to accommodate four concepts; patient flow, staff functions, specialized equipment, and privacy. Areas should be designated specifically for each of the services to be offered.

In order to optimize the use of space for the four concepts listed above, Fleming suggests dividing the office into three principle spaces; the public space, the medical space, and the control, or administrative, space.(22) The public space consists of the patient entrance and waiting area. The medical space encompasses all the exam and treatment rooms, as well as the staff's private areas. The control space should separate the other two spaces and contain the reception area and clerical workspace. The office should be designed such that the public and medical spaces are not more than 90 feet apart.

An important concept put forth by Landry, and others as well, is that the office should be designed around a modular concept.(27) Blocks of space of a given size, commonly 9 feet x 13 feet, should be designated and rooms should be built around multiples of these blocks. This allows for easier design initially and makes future rennovation less complicated.

One of the most widely read optometric authors on this subject is Elmstrom. He states that no perfect or ideal size for an optometric office has ever been agreed upon, however, there has

been some agreement on what rooms should be included and what minimum size those rooms should be.(20) (See Table 1) Even with cost-effectiveness in mind, overcrowding and super-efficiency are not desirable management goals.(21) Elstrom says that the minimum size a one optometrist office should be, built around a standard 23 foot long eye lane, is 600 to 800 square feet, depending on the exact configuration.(20)

In discussing overall clinic size, Peterson states that optometric suites are not different from other health professional offices in their dimensions.(44) The average one doctor health care practice has a minimuim 1,000 square foot office size. He suggests 750 to 900 square feet as the minimum size a single optometrist office should be.(45)

Probably the most prolific optometric author on the subject of office design is Mercer. He is the main proponent of what is termed the data collection center.(33) This is a specially designed area in which the optometric assistant does all the recording and measurement functions s/he is responsible for, such as history taking, lens neutralization, tonometry, perimetry, and miscellaneous other objective testing. The area should encompass a minimum 200 square feet, with 10 feet x 20 feet being the commonly used dimensions.(35) Mercer suggests, as do others, that space should be saved by using room dividers, in lieu of permanent partitions, whenever possible in a large, multipurpose area such as this.(26)(31)

The types of rooms needed and the minimum sizes of each delineated by Mercer are very much in agreement with those of Elmstrom.(20)(32) (See Table 2) Mercer, like others, suggests deciding on the total square footage needed first, and then designing a specific floorplan.(6)(34) If a 20 foot eye lane is to be used, he says the room should measure a minimum 8 feet wide x 23 feet long.(34)

Hubler also stipulates that a minimum 8 foot width be used, regardless of a room's length.(25) He advocates the use of a data collection center encompassing an audio-visual patient education area, if a seperate room is not available for one. The types of rooms needed and their minimum sizes which Hubler lists are somewhat different from those covered previously, but not to a large extent. (See Table 3)

Architectural Literature

The rapid rise in health care costs in recent years has led to a greater emphasis on preventive care, early diagnostic procedures, and outpatient facility utilization. A recent survey done by Yee indicates that this has brought about a new trend in medical architecture.(53) Less building space is being constructed for acute care and inpatient beds, while more space is being allocated for primary outpatient care. Since optometry is a primary care specialty, this trend supports an argument for the allocation of

more optometric workspace.

Certainly one of the most widely referenced medical architectural authors is Shannon. He, along with many other medical architectural specialists, emphasizes several of the same concepts as covered in the optometric literature.(8)(9)(11)(15)(16)(29)(36)(38)(48)(50) The concept of separate public, medical, and control spaces is an emphasized idea. The modular design philosophy, based on 9 foot x 13 foot blocks of space, is a very commonly advocated concept as well. There is agreement among many authors that there exists no specific ideal design for any given medical specialty, and that a specific philosophy of patient care services should precede any facility design project.

Coleman and Kaminsky state that translating services into space is difficult due to the variables involved, but that efficiency and effectiveness can be improved by following certain space-related guidelines.(11) They list minimum size standards for what they have determined to be the basic functional spaces needed in medical offices. (See Table 4)

A basic reference used by architects in the design of specific building types is a book by DeChiara and Callender.(13) They also list what they consider to be the basic space elements of a medical office along with size ranges for each. The ones which apply to optometric offices are listed here. (See Table 5)

Spero and Hasch are widely referenced co-authors on the subject of ophthalmology office design.(49) Although they do not give very many specifics concerning room sizes, they do advocate the necessity for certain room types. (See Table 6) They emphasize that it is important to be able to enter any given room without going through another. The inclusion of a dark room for patients who have had their eyes dilated is mentioned by them. and others, as being important in an eye care office.(49)(54)

Air Force Literature

Air Force optometrists are, by regulation, responsible for delivering a wide variety of services.(14) The Air Force optometrist is to diagnose by performing what is termed a total eye exam, which includes case history, cycloplegic and/or manifest refraction, internal and external ocular pathology detection, visual field study, external and fundus photography, keratometry, and tonometry. In addition, specific clinical tests related to the occupations of certain Air Force personnel must be accomplished. The post-diagnostic care which may be delivered includes prescription of spectacles or other ophthalmic devices, prescription and administration of vision training, contact lens fitting and follow-up care, consultation, and referral to other appropriate healthcare providers.

The Air Force optometrist is also responsible for the performance of certain administrative duties.(14) These duties include

reviewing and updating medical records, ordering ophthalmic devices, providing professional support to other agencies such as school districts, conducting periodic facility evaluations, supervising and training technicians, and participating in environmental vision programs.

The Air Force calculates the amount of work being done by an optometrist based on the number of refractions done and the number of ophthalmic devices ordered each month. Even though historical workload data may not justify it, a minimum of one optometrist and one optometric technician is authorized for each Air Force medical treatment facility.(14)

Several years ago, the Air Force commissioned a civilian planning firm to develop a program of space planning criteria for the construction of new medical treatment facilities. The results of the study were published in 1974 in an extensive report detailing the physical requirements for what was termed a new generation of military hospitals.(7) These detailed physical requirements have been used as basic guidelines for space allocation in new Air Force medical facilities ever since. The guidelines are intended to allocate sufficient space to allow a full scope of health care services to be delivered efficiently.

The study calls for the division of outpatient clinic space into four different categories, called modules, according to the functions to be performed within that space.(7) The four modules

are named the clinic support module the clinic control module, the outpatient service module, and the specialized space module. The clinic support module facilitates the circulation of supplies between the clinic and the rest of the facility. The clinic control module handles the circulation of patients and contains the reception and waiting areas. The outpatient service module contains the basic examination and treatment rooms and private offices. The specialized space module contains whatever additional examination and treatment rooms are needed for non-routine procedures requiring specialized equipment or environments.

The study allocates space to health care specialties according to a clinic organizational hierarchy which is superimposed upon a medical facility hierarchy based on geographic considerations. (7)(23) The first level in the geographic hierarchy is occupied by the Base Level Facilities, which are intended to serve the general health care needs of beneficiaries living within forty miles of the installation. The second level is made up of the ten Regional Hospitals, which not only serve their local beneficiaries, but also provide more specialized care to patients from the Base Level Facilities located within a large surrounding area. The highest level consists of the six Area Medical Centers, which provide the most sophisticated and specialized care available to patients who need it from a still larger designated geographic region.

The clinical organizational hierarchy mentioned previously is applied to each medical facility based on the numbers of health

care providers of a given specialty type authorized at that facility. For example, if four or more optometrists are assigned to one facility, space would be allocated to an autonomous Optometry Clinic. If there are less than four optometrists, optometry is combined with ophthalmology to form an Eye Clinic, within which the Optometry Service would be allocated some portion of the total Eye Clinic space. If the optometrists plus the ophthalmologists number fewer then four, they are combined with the ear, nose, and throat specialists to form an Eye, Ear, Nose, and Throat Clinic, and so on. Eventually, if there are fever than four total specialists, the Optometry Service becomes part of the General or Family Practice Clinic.

Each provider is authorized one private office of 110 square feet within the outpatient service module of his clinic. Eye lanes are also in this module and they are sized at 140 square feet. Optometrists, however, are specifically authorized a one room combination office/eye lane of 195 square feet, in lieu of the above two rooms. The only specialized space module allocated to optometry is a screening room of 140 square feet. All other eye care related specialized space modules are authorized only in the presence of ophthalmology and most, even then, only at an Area Medical Center. The waiting areas of the clinic control modules for eye clinics are authorized to have 55 square feet per provider assigned.

The Air Force Surgeon General has designated a Space Planning

Committee to study and update the space allocation guidelines used in the past. The committee's 1982 update designates that optometry services should have one combination office/eye lane of 195 square feet per doctor, plus one 60 to 80 square foot fitting room and one 110 square foot visual fields room if the service's workload exceeds 350 patient visits per month.(1) A summary of these Air Force optometric workspace guidelines is presented in table form. (See Table 7)

TABLE 1: Minimum optometric office room sizes according to Elmstrom, 1974.(20)

Room Type	Size in Square Feet
Waiting/Reception Room	198
Secretary's Office	60
Refraction Lane	200
Vision Training Room	100
Fields Room	100
Contact Lens Room	50
Treatment Room	85
Dispensary (per table)	65
Private Office	75

TABLE 2: Minimum optometric office room sizes according to Mercer, 1979.(32)(35)

Room Type	Size in Square Feet
Waiting/Reception Room	198
Secretary's Office	60
Refraction Lane Alone	160
Refraction Lane/Office Combined	200
Vision Training Room	100
Fields Room	100
Contact Lens Room	50
Treatment Room	85
Dispensary (per table)	65
Private Office	75
Data Collection Center	200

TABLE 3: Minimum optometric office room sizes according to Hubler, 1974.(25)

Room Type	Size in Square Feet
Waiting/Reception Room	198
Secretary's Office	100
Refraction Lane	185
Vision Training Room	65
Contact Lens Room	65
Consultation/Private Office	65
Dispensary (total)	120
Data Collection Center	150

TABLE 4: Minimum medical office room sizes according to Coleman & Kaminsky, 1980.(11)

Room Type	Size in Square Feet
Waiting Area	135
Administrative Office	150
Secretary's Office	100
Clerk/Typist Office	90
Doctor's Exam Room	100
Private Office	100
Medical Assistant's Work Area	80
General Storage Area	120

TABLE 5: Minimum medical office room sizes according to DeChiara & Callender, 1980.(13)

Room Type	Size in Square Feet
Receptionist Area	35
Waiting Room	110
Consultation Room	110
Exam/Treatment Room	80

TABLE 6: Rooms needed in an ophthalmological office according to Spero & Hasch, 1963.(49)

Room Type	Suggested Minimum Size
Receptionist Area	None given
Waiting Room	50 sq. ft.
Consultation Room	None given
Private Office	None given
Refraction Lane	150 sq. ft.
Fields Room	100 sq. ft.
Treatment Room	100 sq. ft.
Orthoptic Room	None given
Photography Room	None given
Drop Area	None given
Assistant's Work Area	None given

TABLE 7: Summary of Air Force space allocation guidelines for one optometrist plus one assistant if patient visits per month exceeds 350.(1)(7)

Room Type	Size in Square Feet
Waiting Area	55
Combined Office/Eye Lane	195
Fitting Workroom	80
Visual Fields Room	110
Total	440

TABLE 8: Proposed space allocation guidelines for Air Force optometry services with one optometrist plus one assistant.

Room Type	Size in Square Feet
Waiting Area	94
Reception Area	35
Administrative Office	60
Dispensary Area	50
Screening Test Area	50
Combined Office/Eye Lane	200
Visual Fields/Dark Room	100
Special Procedures Room	65
Total	654

Analysis of Findings

Components of an Optometric Workspace

The information found in the literature review will now be analyzed in order to formulate specific recommendations for an optometric workspace design guideline. This analysis will proceed by outlining what component parts the overall workspace should contain and what minimum size each component should be. These components will then be organized into a generalized floorplan for ease of use as a planning guideline.

The first component to be considered is the waiting area. Space must be available here not only for waiting clients but also for others who accompany them. It is generally agreed that each provider should have waiting room space for between three and four persons. The Air Force has determined this number to be 3.9 for eye care providers.(7) The number of square feet needed per person varies in the literature from 12 to 15, with the Air Force standard being 14. In order to be very conservative for purposes of this guideline, the minimum value of 12 sq. ft. will be used. Thus, 3.9 spaces multiplied by 12 sq. ft. per space yields a total of 47 sq. ft. of waiting room space needed per provider.

As an adjunct to the waiting room, there needs to be a client reception area. This area should encompass standing or sitting

room for the receptionist and client, as well as countertop space for references such as appointment schedules and a calender. There is general agreement in the literature that a minimum of 35 sq. ft. should be allocated to the reception area.

The clinical assistant is generally responsible for many administrative functions besides receiving clients and taking appointments. Some of these functions include ordering supplies, preparing correspondence, doing bookkeeping, transcribing records, and maintaining various files. Sufficient clerical office space within which to accomplish these tasks must be available in order to ensure efficiency and privacy. The range of suggested sizes for a clerical office mentioned in the literature is from 60 sq. ft. to 110 sq. ft.

In addition to their clerical duties, clinical assistants are responsible for performing certain patient examination procedures. For maximum efficiency, the assistant should have a completely separate examination area so that s/he and the doctor may see patients simultaneously. For maximum conservation of space, all of the assistant's test equipment can be grouped into one area, as indicated by Mercer's data collection center idea. The minimum suggested size for a data collection center found in the literature is 150 sq. ft.

The clinical assistant is also the one who usually dispenses, adjusts, and repairs spectacles. These functions are best

accomplished in the same area so that the needed tools and supplies are always handy. To conserve space, the initial frame selection functions, or style center, can be incorporated into this same area. The size of this area can vary greatly, depending on how many frames are available and how they are displayed. The minimum suggested overall dispensary size found in the literature is 65 sq. ft. per worker.

The backbone of an optometric clinic is, of course, the refraction lane. It is here that the optometrist does most of his examination procedures and patient consultation. The standard refraction lane is based on a 20 foot test distance, although mirrors can be used to shorten that length if desired. Exactly which optometric procedures are done in this room, and which are not, largely depends on what other space the optometrist has available. For a basic minimum procedure refraction lane the smallest suggested size in the literature is 150 sq. ft.

Most health care providers, and medical architects, prefer to include a private provider's office in a clinic floorplan. This gives the provider an out of the way place to conduct private business, attend to administrative matters, and perhaps do some patient consultation out of the main examination room. The minimuim suggested size for a private office found in the literature is 75 sq. ft. Since the refraction lane is such an integral part of the optometrist's routine many optometrists prefer to combine a private office area with the eye lane. In this

design, the minimum suggested size for a combined refraction lane/private office is 200 sq. ft.

Optometrists provide certain specialty services, either alone or in combination with an assistant, which are best allocated separate space due to the equipment and facilities required. These specialty services include contact lens fitting, vision training, and low vision work. Separate areas for these services allow the doctor and assistant to handle patients without interfering with one another's work flow. Contact lens dispensing requires patient access to countertop space, a mirror, and a sink, since the patient must receive in-office instruction and practice with the lenses. The smallest suggested size for a contact lens room is 50 sq. ft. Vision training services require a wide variety of instruments and ample countertop and floor space with which to work. The minimum sized room suggested for use in vision training is 65 sq. ft. Low vision work requires refractive procedures which are generally done in the standard sized refraction lane, as previously covered.

There are various other special procedures done by optometrists which require specific instrumentation in combination with altered room lighting. Visual fields testing, a frequently used procedure, requires controlled ambient illumination. Ocular photography also may necessitate controlled lighting. Various types of recently developed electro-diagnostic testing procedures require specific illumination levels. Some of these tests have the prerequisite

that the patient be dark-adapted, and many require the patient's eyes to be dilated. Both of these procedures are best accomplished in a dark room separated from other interfering clinical activity. The amount of space needed for these special dark room procedures depends on how much and what type of testing equipment the optometrist utilizes. The minimum amount of this equipment any optometry clinic must have is a visual fields testing capability, and the almost universally suggested size of a fields room is 100 sq. ft.

These are the basic components of an optometric workspace. Additional space is, of course, needed for hallways, general storage, toilets, and lounge areas. The specific building the clinic is located in and the specific workspace configuration will greatly dictate the sizes and shapes of these areas.

Air Force Optometric Space Requirements

Air Force optometry is a part of a larger comprehensive health care system. The Air Force optometric workspace is generally located within a multi-disciplinary outpatient clinic building. The client population served, although it does encompass all ages, is skewed toward a specific age and type of individual needing specific occupational eyecare. These factors must be taken into account when formulating a workspace guideline specifically for Air Force optometric services based on generalized recommendations found in the literature. Similar situations do occur in some types

of civilian practices, such as health maintenance organizations, which can serve as useful models. (40)

Since Air Force optometry services are generally located within multi-purpose clinic or hospital buildings, there is usually a designed sharing of certain spaces with other services. This is very often the case with waiting rooms. Shared waiting space conserves total space needs but only works well if each service has sufficient square footage available. As noted earlier, each optometric provider should have 47 sq. ft. of waiting room space. Since Air Force optometry technicians engage in screening exams on clients, other than those scheduled to see the optometrist, both the technician and the doctor should be considered providers for purposes of waiting room space allocation. Thus, this guideline will specify that a minimum of 94 sq. ft. of waiting room space be available.

As with waiting rooms, reception areas may be space shared by multiple services. Again, it is important that each service have sufficient space allocated to maintain its individual function. Countertop space for a patient log and appointment schedule for each service needs to be available. A recent advance at many military medical facilities is the use of computerized appointment systems. This would entail specialized space for a CRT and keyboard. This guideline will specify a minimum of 35 sq. ft. be available for the reception area.

Since Air Force medical facilities have centralized patient records sections there is no need to maintain patient files at the clinical service level. No fees for services are required so there are no patient related financial records to process. These factors eliminate some of the need for administrative space that exists in civilian clinics. There are numerous administrative functions necessary at the Air Force clinical service level, however, from ordering supplies to maintaining various files. At least the minimum recommended amount of clerical space found in the literature is needed. This guideline will specify that 60 sq. ft. of administrative space be allocated.

Since there is little choice of frames available to the patient through Air Force channels, no frame selection area is needed. There is a large volume of spectacle dispensing, adjusting and repairing at most facilities so a dispensary space is needed. The minimum suggested size for any workroom found in the literature is 50 sq. ft. Therefore, this guideline will specify that at least 50 sq. ft. be allocated for dispensary services.

The literature indicates that the grouping of all the optometric assistant's examination functions into a single data collection center maximizes the use of time and space. This area is intended to include visual fields testing as well as the other procedures an assistant routinely does. As mentioned previously, a separate room for fields and other subdued lighting procedures is necessary. Since many Air Force personnel are required by

regulation to have fundus photography, night vision testing, and various other darkroom procedures done routinely, a separate room for these activities is even more of a necessity. Thus, this guideline will specify that a separate fields room of at least 100 sq. ft. be allocated. Subtracting this from the 150 sq. ft. minimum sized data collection center leaves at least 50 sq. ft. to be specified for screening activities.

If the full scope optometry delineated in Air Force regulation is to be practiced, space for the specialty services of contact lens fitting and vision training must be available. To conserve as much space as possible these specialty functions can be relegated to a single area. This guideline will specify a room of at least 65 sq. ft. in size be allocated for specialty services.

The Air Force optometrist's needs in regards to a refraction lane and private office are the same as any eye care practitioner. In order to conserve as much space and as many steps as possible, a combination eye lane/private office is desirable. This guideline will specify a 200 sq. ft. minimum sized combined refraction lane/private office be allocated.

Conclusions

Critique of Present Air Force Guidelines

The previous analysis is geared toward the space requirements of a one optometrist, one assistant Air Force optometric service. (See Table 8) The conclusions of this analysis will now be compared to existing Air Force space guidelines for this same service. (Refer to Table 7) This comparison is patterned after the question asked by the American Optometric Association's Council on Clinical Optometric Care when it evaluates facilities, namely, "Is the space conducive to effective patient care?".(4) The Air Force Inspector General's Medical Services Inspection Guide states that optometry facilities should be adequate to provide for all optometric functions, including specialty services.(24) Existing guidelines and those proposed by this analysis will be compared with these facts in mind.

The existing allocation of 55 sq. ft. of waiting area is adequate for only one provider. As explained earlier, waiting room space for two providers is justified in this situation. No specific recommendation at all is given for reception area space in the current guideline.

The allocation of 195 sq. ft. for a combined office/eye lane in the current guideline is close to that indicated by this analysis. The same is true for the 110 sq. ft. visual fields room

allocation. The current guideline's 50 sq. ft. fitting workroom, however, falls somewhat short of the 50 sq. ft. dispensary plus the 50 sq. ft. screening area of this analysis as a combined assistant's clinical workspace. Some sacrifice of efficient operation and patient privacy will result from use of an overcrowded area.

The current guideline allocates no space for administrative and clerical functions at all. Attempting to integrate these functions into what should be clinical space only results in less efficient accomplishment of both functions, as well as compromising the privacy of patients and security of files. The space guideline should address this question of administrative space.

No space is specifically allocated in the current guideline for any specialty service area. As previously mentioned, only Area Medical Centers are authorized specialized space modules for such services, even though optometrists could deliver these services at base level facilities if they had the opportunity. Only 15% of Air Force beneficiaries have primary access to Area Medical Centers, with the remaining 85% having to bypass their local facilities to reach them. (2) The inclusion of a special procedures area, such as this analysis recommends, would go a long way toward alleviating this inefficient and costly practice.

New Space Guidelines Proposal

As seen in the foregoing comparison, present Air Force optometric space guidelines appear to fall short of what are generally accepted space standards for the delivery of full scope optometric care. The newly proposed guideline, as developed in the previous analysis, which takes these shortcomings into consideration is presented in a summarized table form. (Refer to Table 8 on page 25)

Application of Proposed Guidelines

In order to be of maximum utility, the newly proposed space guideline needs to be applicable to a real world clinical setting. This involves being able to translate the square footage requirements listed into a workable building floorplan. Such a floorplan encompassing the new guideline is presented in Figure 1. (See Figure 1 on page 39)

Obviously, the particular building in which a new clinic is to be located will dictate to some extent what the actual floorplan will be. The floorplan presented here is intended only as a model for purposes of easy reference. It encompasses the basic ideas found in the literature review and is based on the 9 ft. x 13 ft. modular concept, which is common in medical facility construction today, so as to be as transferable as possible into any new building.

Summary

Perceived Problem and Proposed Solution

An analysis of the subject has shown that existing Air Force optometric space allocation guidelines fall short of minimum accepted space recommendations found in the literature. These shortcomings are causing a loss of cost-effectiveness in eye care delivery and much inconvenience and hardship to both patients and staff. An updating of these guidelines with justifications for allocation of more space for additional services has been presented as a proposed solution to the problem. These newly proposed guidelines have been applied in the derivation of a model floorplan for Air Force Optometric services.

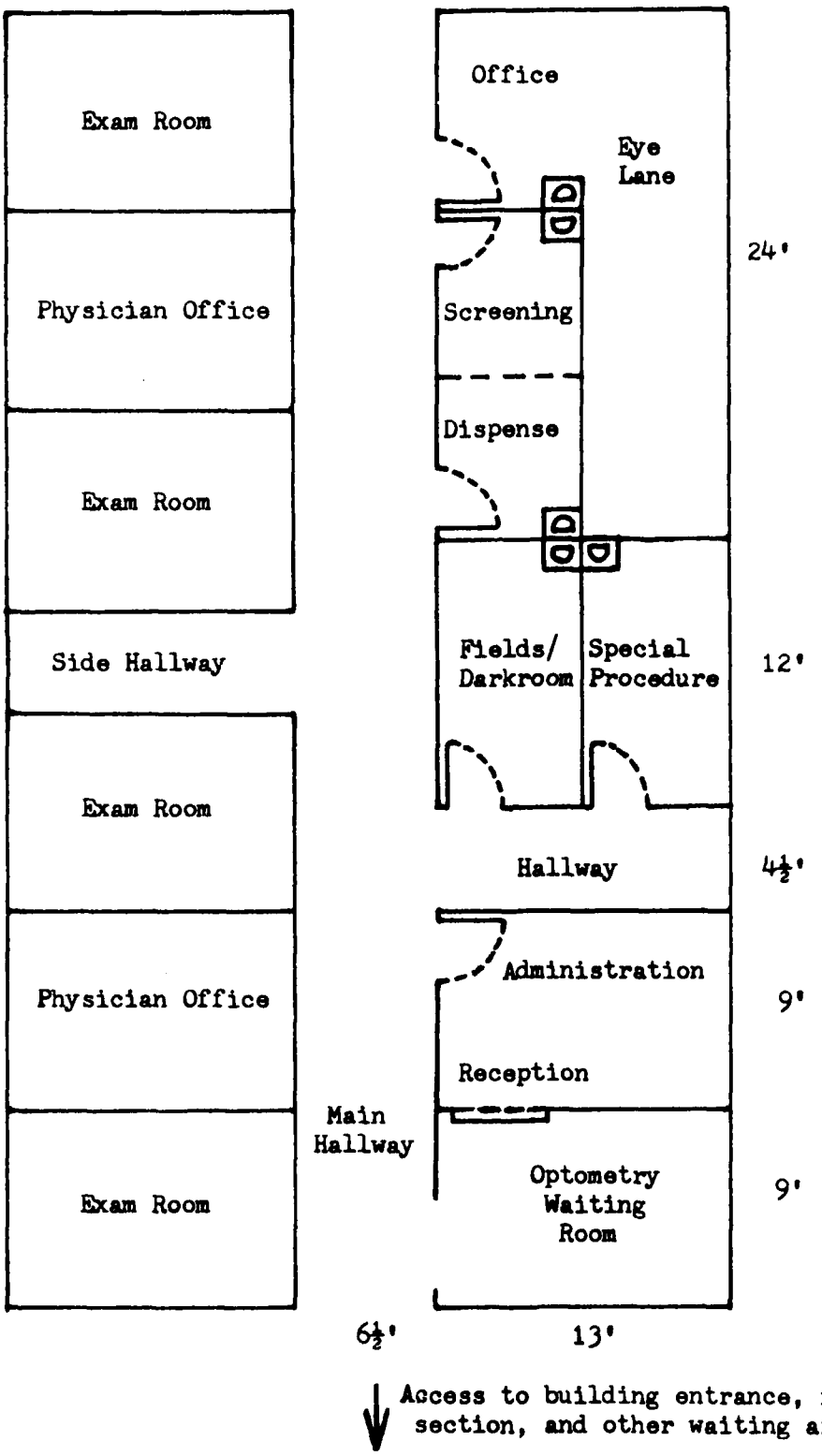
Discussion

The space guidelines proposed are for one optometrist and one technician, but they could be easily applied to clinics with more personnel. If another technician were added, only more screening room and waiting room space would be needed. If another optometrist were added, another combined office/refraction lane along with additional waiting room space would be needed. The rest of the clinical space is shared space and need not be expanded for every addition of personnel. Careful scheduling of specialty

procedures can maximize the use of the existing space allocated for them without requiring an expansion in the space's size with increased manpower.

The recommendations of this study are intended as input into future planning of Air Force optometric workspace. Obviously, changes in technology and modes of practice will require continuing changes in workspace guidelines. The concept of full scope practice being available at all Air Force optometric services, however, is something that ideally should not change in the future.

Figure 1: An optometric service floorplan derived using proposed guidelines which has been incorporated into a 9 ft. x 13 ft. modular medical facility. (1/8'' = 1')



Definition of Terms

base level facility - a military organizational unit which supplies its specific services to those near or connected with the installation on which it is located

binocular dysfunction - visual difficulty which is due to an inability to use the two eyes together well

CHAMPUS - the Civilian Health and Medical Program of the Uniformed Services

cost-effectiveness - the ability to accomplish the desired task or get the desired results with a minimum expenditure of money and effort

cycloplegics - drugs which paralyze the muscle responsible for changing the eye's focus; these drugs are sometimes used in refractive tests

developmental vision - that aspect of vision care which deals with the natural growth process of the visual-motor system and the treatment of its deviations from the norm

dilated - that state of an eye in which the pupil is opened unusually wide; may be accomplished with the use of certain eyedrops

dispensary - that part of a vision care clinic in which spectacle frames are selected, adjusted, and repaired

eye lane - that examination room in which refractive testing is done

full-scope care - the extent of care which entails the most complete range of operations possible

fundus - the back of the eye

installation - a military base or unit of operation

keratometry - an ocular diagnostic test which measures the curvature of the front of the eyeball

low vision - that aspect of vision care which deals with patients who cannot achieve normal visual acuity with the best ophthalmic correction in place

manifest - the type of refractive test which is done without the installation of any drugs, as opposed to a cycloplegic refraction (see cycloplegics)

medical treatment facility - a term used to describe any entity which delivers any type of military health care

neutralization - the process used to determine the power of an existing prescription ophthalmic lens

optometry service - a facility supplying a demand for optometric care which is but a part of a larger clinical entity

orthoptics - synonomous with vision training (see vision training)

perimetry - a type of visual field charting (see visual field)

pre-paid health care - administration of health care service by an organized group of providers to all members of a given population with funds derived from previous assessments

provider - any deliverer of some type of professional health care

refraction - diagnostic testing which is done to measure the variance from perfection of the focus of an eye in a relaxed state

referral center - a facility which supplies its services to persons sent to it by smaller, less capable facilities located within a large surrounding area

subnormal vision - (see low vision)

tonometry - the clinical test used to determine an eye's internal pressure

tri-service - including the three major branches of the Department of Defense, the Army, Navy, and Air Force

vision training - an advanced therapeautic discipline which utilizes numerous non-surgical, physical therapy type procedures to treat visual dysfunctions

visual fields - the measuring of the ability of peripheral portions of the eye to discern form, motion, and color

Bibliography

1. AFMSC/SGSF. "Space Planning Criteria: Section 8 - Air Force Clinics," Clinics File. U.S. Air Force: August, 1982, pp. 1-16.

2. Air Force Data Services Center. Data Base Display of USAF Medical Facilities. Air Force Communications Command: Spooled April 17, 1981.

3. Air Force Surgeon General's Office/Medical Service Center. Unpublished data. Brooks AFB, Texas: Division of Biostatistics, 1982.

4. American Optometric Association. Manual of the Counseling and Accreditation Program of the Council on Clinical Optometric Care. St. Louis: American Optometric Association, 1979, pp. 1-4.

5. A.O.A. Task Force on Optometric Manpower. A Projection of Optometric Manpower Needs in 1990. St. Louis: American Optometric Association, 1981.

6. Bausch & Lomb Professional Office Planning Service. Planning for Practice. Rochester: Bausch & Lomb Optics Center, 1979.

7. Benham-Blair and Affiliates, Inc. Physical Requirements and Facilities Development Model. New Generation Military Hospitals. Volume I - Space Planning Criteria. Springfield: National Technical Information Service, 1974.

8. "Building Types Study 419: Building for a Broad Spectrum of Health Care," Architectural Record, v. 149, March, 1971, pp. 135-150.

9. Cammock, Ruth. "Confidentiality in Health Centers and Group Practices: The Implications for Design," Journal of Architectural Research, v. 4, February, 1975, pp. 5-17.

10. Coble, Rollo J. and others. "The Family Physicians's Office: Proposed Design Criteria for Family Centered Medical Care," The Journal of Family Practice, 14(1), January, 1982, pp. 77-81.

11. Coleman, John R. and Frank C. Kaminsky. "Sizing Free-Standing Ambulatory Care Facilities," Journal of Ambulatory Care Management, 2(4), November, 1979, pp. 1-21.

12. Comptroller General of the United States. Legislation on Sizing Military Medical Facilities Needed to Correct Improper Practices, Save Money, and Resolve Policy Conflicts: Report to Congress. Gaithersburg: U.S. General Accounting Office, 1981.

13. DeChiara, Joeseph and John Callender, editors. Time Saver Standards for Building Types, 2nd. ed. New York: McGraw-Hill Book Co., 1980, pp. 802-805.

14. Department of the Air Force. Air Force Manpower Standard 5235: Ophthalmology/Optometry. Washington: U.S. Government Printing Office, 1980.

15. Diaz, James R. "The Hospital Affiliated Medical Office Building," Architectural Record, v. 157, February, 1975, pp. 53-57.

16. Diaz, James R. "The Medical Office Building," A.I.A. Journal, v. 60, August, 1973, pp. 28-35.

17. D.O.D. Medical Facilities Criteria Committee. Space Planning Criteria - Dept. of Clinics. Washington: Office of the Deputy Asst. Secretary of Defense for Health Resources & Programs, 1972.

18. Dunton, Donald D., Col, USAF, Associate Biomedical Science Corp Cheif for Optometry. Personal conversation, 1982.

19. Dunton, Donald D., Col, USAF, Associate Biomedical Science Corp Cheif for Optometry. Unpublished survey of USAF optometry services floorplans, 1981.

20. Elmstrom, George. Advanced Management for Optometrists. Chicago: The Professional Press, Inc., 1974.

21. Elmstrom, George. "Office Design: Economics and Traffic Patterns," Optometric Weekly, 67(7), February 12, 1976, pp. 150-170.

22. Fleming, Robert W. "Design of Outpatient Areas," Hospital Topics, 51(10), October, 1973, pp. 45-49.

23. HQ ATC/AFIT. AFIT Regulation 53-7. Wright-Patterson AFB, Ohio: Department of the Air Force/Air University, 1980.

24. HQ USAF/IGEP. "Inspection Guide: Medical Service," The Inspector General Brief, Volume 32, Number 12, 13 June, 1980.

25. Hubler, Richard and others. "Your Office - Eye Care by Design," Optometric Management, 10(4), April, 1974, pp. 13-115.

26. Kuntz, Esther. "Flexible Open Plan Saves Office Space," Modern Health Care, 9(7), June, 1979, pp. 38-39.

27. Landry, M. G. "Planned Medical Office Layout: Less Walking Equals More Patient Contact Time," Canadian Medical Association Journal, 120(9), May 5, 1979, pp. 1150-1152.

28. Mann, George J. "The Impact of Change on Health Care Facilities," A.I.A. Journal, v. 60, August, 1973, pp. 14-17.

29. Marlin, William. "Building Types Study 537: The Baldwin Community Medicine Building of the Mayo Clinic," Architectural Record, v. 166, October, 1979, pp. 112-119.

30. "Medicine's Week: Military Hospitals," American Medical Association News, March 20, 1981.

31. Mercer, Charles G. "Ophthalmic Office Gardening," Optometric Weekly, 63(4), January 27, 1972, pp. 29-31.

32. Mercer, Charles G. "Plan Before You Plunge," Office Planning Studies. Rochester: Bausch & Lomb, 1979.

33. Mercer, Charles G. "The Data Collection Center in the Ophthalmic Office," Optical Journal & Review of Optometry, 110(17), September 1, 1973, pp. 28-29.

34. Mercer, Charles G. "The Refraction Duo: Most Promising Development in Current Office Planning," Office Planning Studies. Rochester: Bausch & Lomb, 1979.

35. Mercer, Charles G. "Your Data Collection Center," Office Planning Studies. Rochester: Bausch & Lomb, 1979.

36. "News Report: In Progress," Progressive Architecture, v. 58, February, 1977, p. 38.

37. Nicholson, H. B. "U.S.A.F. Hospital Mountain Home Markets Health Care," USAF Medical Service Digest, March-April, 1981, pp. 23-25.

38. "Open-plan Community Clinic," Interiors, v. 134, December, 1974, pp. 72-73, 114.

39. "Panel Proposes Changes in Military Hospital Policy," American Medical News, February 13, 1981, p. 12.

40. Pennington, John. "Optometric Participation in the HMO," American Journal of Optometry & Archives of the American Academy of Optometry, 49(9), September, 1972, pp. 764-768.

41. Peters, Henry B. "Optometric Goals and Priorities," Journal of the American Optometric Association, 48(6), June, 1977, pp. 729-732.

42. Peters, Henry B. and Kenneth A. Polse. "Alabama's Operatory," Journal of the American Optometric Association, 43(11), October, 1972, pp. 1133-1140.

43. Peterson, Stephen E. and Alvin E. Rodin. "Instruction in Physical Facility Construction for Medical Students," Journal of Medical Education, 57(4), April, 1982, pp. 323-325.

44. Peterson, Roger. "So You Want to Build a Professional Building," Optometric Management, 9(11), November, 1973, pp. 27-32.

45. Peterson, Roger. "To Build the Best Professional Building . . . and the Best Investment," Optometric Management, 9(12), December, 1973, pp. 53-59.

46. Public Health & Optometric Care Committee / Group Health Association of America."Guidelines for Vision Care in Prepaid Group Practice, Manual on Optometry and HMOs: Guidelines for Action. St. Louis: A.O.A. National Health Division, 1978, pp. 45-58.

47. Richardson, William O. A Manpower Formula for U.S. Army Optometry Clinics. Masters Thesis: Pacific University, Forest Grove, Oregon, 1981.

48. Shannon, William R., Jr. "Architecture for Group Practice: Master Plan by Design," Group Practice, 2(4), November, 1970, pp. 20-23.

49. Spero, Bernard and Ernest J. Hasch. "The Office Plan," International Ophthalmology Clinics, 3(2). Boston: Little, Brown & Co., June, 1963, pp. 387-400.

50. U. S. Bureau of Community Health Services. The Health Maintenance Organization Facility Development Handbook. Rockville: U. S. Department of Health, Education, and Welfare, 1975.

51. Wein, George. "Five Steps for Getting a Better Medical Office," Physician's Management, 16(8), August, 1976, pp. 36-42.

52. "Working Definition of an Optometrist," Journal of Optometric Education, 4(1), Summer 1978, p. 12.

53. Yee, Roger. "Building Types Study 563: Towards a More Humane Health Care," Architectural Record, v. 169, August, 1981, pp. 88-103.

54. Zoehrer, Richard. "Ophthalmologist's Office," Contract Interiors, v. 136, December, 1977, pp. 86-87.


FILM